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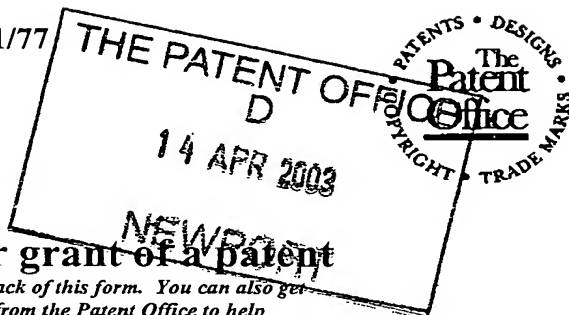
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P01/7700 0.00-0308561.0

# Request for grant of a patent

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1.	Your reference	P-UK-PR1110B		
2.	Patent application number <i>(The Patent Office will fill in this part)</i>	0308561.0		
3.	Full name, address and postcode of the or of each applicant <i>(underline all surnames)</i>	Black & Decker Inc. Drummond Plaza Office Park 1423 Kirkwood Highway Newark, Delaware USA		
	Patents ADP number <i>(if you know it)</i>	341214004		
	If the applicant is a corporate body, give the country/state of its incorporation	Delaware, USA		
4.	Title of the invention	PLANER		
5.	Name of your agent <i>(if you have one)</i>	Ian S Bell		
	"Address for service" in the United Kingdom to which all correspondence should be sent <i>(including the postcode)</i>	Black & Decker Patent Department 210 Bath Road Slough Berks SL1 3YD United Kingdom		
	Patents ADP number <i>(if you know it)</i>	8130148001		
6.	If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and <i>(if you know it)</i> the or each application number	Country	Priority application number <i>(if you know it)</i>	Date of filing <i>(day / month / year)</i>
7.	If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application	Number of earlier application	Date of filing <i>(day / month / year)</i>	
8.	Is a statement of inventorship and of right to grant of a patent required in support of this request? <i>(Answer 'Yes' if:</i> a) <i>any applicant named in part 3 is not an inventor, or</i> b) <i>there is an inventor who is not named as an applicant, or</i> c) <i>any named applicant is a corporate body.</i> See note (d))	Yes		

## PLANER

The present invention relates to a planer and in particular to debris collection containers for a planer and airflow and chip removal in a planer.

Planers comprise a body mounted on a shoe. A rotatable cutting drum is  
5 mounted within the body which is rotatingly driven by an electric motor also mounted within the body. An aperture is formed through the shoe through which part of the periphery of the cutting drum extends. Cutting blades are mounted on the drum which, as the drum rotates, periodically pass through the aperture and below the shoe. In use, the shoe is located on a work piece and the drum is rotatingly driven by  
10 the motor. When the blades pass through the aperture and move below the shoe, the blades engage with the workpiece and remove a thin slice of the workpiece from the surface of the workpiece, producing shavings or chips. Due to the rotational movement of the drum, the shavings or chips are thrown in a generally forward and upward direction in relation to the planer. One problem is the removal of the shavings  
15 or chips from the cutting area of the planer. A second problem is the collection of the shavings or chips for disposal.

In some designs of planer, the chips or shaving are directed using a deflector which directs the shavings or chips side ways from the planer. A fan or impeller  
20 mounted on the drive shaft of the motor can be used to generate an airflow which can be used to assist in the removal of the shavings or chips. DE19512262 discloses such a system. However, the problem with existing designs are that they are not efficient at mixing the air flow with the shavings or chips to entrain them for removal.

25 In order to collect the chips or shavings, a debris collection container is attached to the aperture through which the chips or shavings are ejected from the body of the planer. Existing designs of debris collection containers comprise a metal wire frame which is covered by a cloth bag such as a canvas bag. A tubular connector is attached to the metal wire frame and cloth bag and which can be  
30 attached to the ejection aperture so that the chips or shavings can pass through the connector from the planer to the debris collection container. A zip is sewn into the side of the cloth bag which, when opened forms an aperture through which the

Figure 5 shows a design drawing of a lengthwise slice taken through the planer at the position indicated by dashed line Z in Figure 2 (excluding the handle);

Figure 6 shows a perspective view of the first embodiment of a debris collection container;

5        Figure 7 shows an exploded view of the debris collection container excluding the cloth bag and circular end piece;

Figure 8 shows a perspective view of the debris collection container with the cap detached from the receptacle;

10       Figure 9 shows a side view of the second embodiment of the debris collection container;

Figure 10 shows a side view of the debris collection container with the cap detached;

Figure 11 shows a sketch of the connection mechanism of the second embodiment of the debris collection container;

15       Figure 12 shows a sketch of a top view of the planer with a debris collection container attached;

Figure 13 shows a design drawing of a lengthwise vertical cross section of the second embodiment of the planer through the centre of the planer (excluding the motor and handle);

20       Figure 14 shows a design drawing of a lengthwise slice taken through the second embodiment of the planer(excluding the handle);

Figure 15 shows a second downward side view of the planer with the deflector inserted;

25       Figure 16 shows a design drawing of a lengthwise slice taken through the third embodiment of the planer(excluding the handle);

Figure 17 shows a vertical cross-section of the deflector located in a first position within the planer in accordance with the fourth embodiment of the planer; and

30       Figure 18 shows a vertical cross-section of the deflector located within the planer in a second position in accordance with the fourth embodiment of the planer.

A first embodiment of the planer will now be described with reference to Figure 1 to 5. The planer comprises a body 2 having a handle 4 attached to the top of the body 2. A cutting drum 6 is rotatably mounted within a recess 50 in the body 2 of the

26 is such that it fits snugly into the aperture 24 in the side wall of the body 2 of the planer in order to hold the deflector securely and prevent it from rotating within the aperture 24. Formed between the two sections 28, 30 is an annular rib 38 which surrounds the circumference of the deflector 26. The outer diameter of the annular rib 38 is greater than the diameter of the aperture 24 and thus prevents the deflector 26 from being inserted too far into the planer. When the deflector 24 is located within the body 2 of the planer, the rib 38 abuts against a side wall of the body 2 of a planer, the tubular section 28 remaining outside of the body. The rib is angled 35 in relation to the longitudinal axis 33 of the tubular section 28 so that it is less than ninety degrees as shown in Figure 3. This is to allow the tubular section to point upwards when located within the body of the planer. The deflector 26 is formed as a one-piece construction and is made from plastic moulded into the appropriate shape.

Mounted on the drive spindles of the motor is of fan (not shown) which generates an airflow. The air is directed into a cavity 40 formed in the body of the planer. The air then passes through a conduit 42 over the top wall 44 which forms the top wall of the aperture 24. The direction of the airflow is indicated by Arrows W. The airflow is then directed downwardly to an area 46 in the body 2 forward of the wall 48 of the recess 50 in which the drum 6 is mounted. An expulsion aperture 52 is formed in the wall 48 of the recess 52 forward of the cutting drum 6 through which any debris created by the cutting action of the blades 16 would be thrown by the rotating blades 16. The airflow is directed within the body to a point below the expulsion aperture 52 in the wall of the recess and is directed to be blown across the aperture 52 within the body in a direction having an acute angle to the direction of travel of any debris (shown by Arrow T) in order to entrain the debris in the airflow within the body.

The airflow and entrained debris is directed upwardly until it engages with the underside of the curved section 30 of the deflector 26 which is located within the aperture 24 when the planer is in use. The airflow and entrained debris is then directed out of the side of the planer through the tubular section 28 and into a debris collection container.

A second embodiment of the planer will now be described with reference to Figures 13 to 15. Where the same features are shown in second embodiment as

been used. The fourth embodiment is similar to the first embodiment except that a curved pivotal flap 200 is pivotally mounted within the aperture 24 where the deflector 26 is located.

5           The curved pivotal flap 200 is mounted about an axis 202 which extends in a vertical plane through the centre of the width of the body 2 of the planer. The axis 202 is angled downwardly by a small amount relative to the horizontal so that the curved pivotal flap 200 pivots between an internal wall 206 of the body of the planer forming the top wall of the aperture 24 to the bottom side wall 208 of the entrance of  
10   the aperture. The curved pivotal flap 200 extends from the axis of pivot 202 to the right side 204 of the body of the planer as shown in Figures 17 and 18. The curved pivotal flap 200 is capable of pivoting from a position indicated by reference letter Q through the position indicated by the reference letter R shown in dashed lines in figure 17 to a position indicated by reference letter S also indicated in figure 17 by  
15   dashed lines but shown as a solid line in Figure 18. A spring (not shown) biases the curved pivotal flap to the lower position indicated by reference letter Q as shown in figure 17.

When the deflector 26 is not located within the planer, the curved pivotal flap  
20   200 is biased to a downward position indicated by reference letter Q. When the flap 200 is located in this position, it forms an upper wall for right half of the aperture 24 as viewed in figure 17 which is aligned with the upper wall 210 of the left hand side of the aperture 24 formed by the internal structure of the body 2 to of the planer to produce a continuous curved upper surface of the aperture 24. When the curved  
25   pivotal flap is its downward position, it completely blocks the right hand entrance 212 to the aperture 24 from the chamber 214 where the air and entrained debris pass from the drum in order to be expelled.

When the deflector 26 is inserted into the aperture 24 from the left-hand side as  
30   shown in figure 17, the second section 30 of the deflector 26 is located adjacent the upper wall 210 of the left hand side of the aperture 24 formed by the internal structure of the body 2 and by the curved pivotal flap 200 on the right hand side of the aperture 24. The insertion of the curved second section 30 of the deflector 26 causes no movement of the curved pivotal flap 200. The shape of the curved pivotal

Figures 6 to 8 show the first design of debris collection container which can be used with any of the three embodiments of planer previously described. The debris collection container comprises two sections, an end cap section 60 and the receptacle 70. The end cap section 60 is manufactured in a one-piece construction from transparent plastic. The end cap section 60 comprises a tubular connection section 62 which connects to the first tubular section 28 of the deflector 26. The tubular connection section 62 has a circular aperture (not shown) at one end whilst the other end meets with a dome shaped section or part spherical section 64. The dome shaped section 64 comprises a rim 66 which surrounds a large aperture formed in the base of the dome shape section 64. The rim 66 comprises an L-shaped slot 68 which forms part of a bayonet connection system for use in connecting the end cap section 60 to the receptacle 70. Air and entrained debris pass through the aperture in the end of the tubular connection section 62, through the tubular connection section 62 and into the dome shape section 64 before being expelled from the end cap section 60 through the large aperture in the base of the dome 64. The shape of the dome is such that it acts as a deflector, bending the air and entrained debris through ninety degrees so that the air and entrained debris are travelling perpendicular to the direction they were travelling in when they were passing through the tubular connection section 62. By constructing the dome shape section 64 in transparent plastic, the operator of the planer can look into the debris collection container to determine how full container is. Furthermore, as the planer is operating, the operator will be able to see the entrained debris passing through the tubular connection section 62 and pass through the dome section thereby enabling the operator to see that the planer is working correctly.

25

The receptacle 70 comprises a one end an annular plastic ring 72 which surrounds a large circular aperture which forms of the entrance to the receptacle 70. The annular plastic ring 72 is divided lengthwise into two halves, a front half 74 having a diameter less than that of the in the diameter of the rim 66 of the dome shaped section 64 of the end cap section 60, and a second rear half 76 having a diameter equal to that of the outer diameter of the rim of the dome shape section 64 of the end cap section 60. A lip 78 is formed between the front and rear sections 74, 76 which abuts against the side of the rim of the dome shaped section 64 of the end cap section 60 when the end cap section is connected to the receptacle. Two pins 80

30

84 under compression and substantially reducing the volume of the space within the receptacle. This is ideal for storage purposes.

5 In use, the tubular connection section of the end cap is connected to the deflector 26 on the planer. The receptacle 70 is connected to the end cap section by use of the bayonet connector. The circular end piece 82 is disconnected from the catch 88 on the annular plastic ring 72 to allow the helical spring 84 to bias the circular end piece 82 away from the plastic annular ring 72 generating the shape of the container.

10

Referring to figures 9 to 11, a second design of debris collection container is shown. The debris collection container comprises an end cap 100 and a receptacle 102 which is capable of being attached to the end cap 100. The end cap 100 is manufactured in a one-piece construction from transparent plastic. The end cap 100  
15 comprises a tubular connection section 104 which connects to the first outer section 28 of the deflector 26. The tubular connection section 104 has a circular aperture at one end whilst the other end meets with a dome shaped or semi-spherical section 106. The dome shape section 106 is mounted on a rectangular base 108 which comprises a rectangular rim 110 which surrounds a large aperture formed in the base  
20 of the dome shape section 106. The rim 110 comprises a T-shaped slot 112 which forms part of a connection system for use in connecting the end cap 100 to the receptacle 102. Air and entrained debris pass through the aperture in the end of the tubular connection section 104, through the tubular connection section and into the dome shape section 106 before being expelled from the end cap 100 through the  
25 large aperture in the base 108 of the dome. The shape of the dome 106 is such that it acts as a deflector for the air and entrained debris and causes it to bend through ninety degrees so that the air and entrained debris are travelling perpendicular to the direction they were travelling in when they were passing through the tubular connection section 104. By constructing the end cap 100 in transparent plastic, the  
30 operator of the planer can look into the debris collection container to determine how full the container is. Furthermore, as the planer is operating, the operator will be able to see the entrained debris passing through the tubular connection section and pass through the dome section thereby enabling the operator to see that the planer is working correctly.



Figure 12 shows the view of the second embodiment of the debris collection container attached to the planer. As can be seen, the debris collection container is located along side the planer and the longitudinal axis 132 of the debris container extends in parallel to the longitudinal axis 130 of the planer.

4. A planer as claimed in claim 3 wherein the deflector forms the lower wall of the conduit 42 through which the airflow passes over the deflector.
5. A planer as claimed in any of the previous claims comprising a body comprising an aperture formed within it to accommodate the deflector.
6. A planer as claimed in claim 5, wherein the deflector is located within the body at a down ward slope from the edge of the body towards the centre of the body.
- 10 7. A planer as claimed in either of claims 5 or 6, wherein there is provided a movable flap 200 which is capable of being moved between a first position where it covers an entrance 212 of the aperture 200 and a second position where at least part of the entrance 212 is uncovered.
- 15 8. A planer as claimed in claim 7, wherein the aperture comprises two entrances, the flap being arranged to cover or uncover one of the entrances.
9. A planer as claimed in claim 8 wherein, when the flap is located in the first position and the deflector is removed from the body, the flap assists in guiding the  
20 airflow and entrained debris through the entrance which is not covered by the flap.
10. A planer as claimed in any of claims 7 to 9, wherein the flap is pivotally mounted within the body and is capable of pivoting between the first and second positions.
- 25 11. A planer as claimed in Claim 10, wherein the axis of pivot extends in a vertical plane through the centre of the width of the body.
12. A planer as claimed in either of claims 10 or 11, wherein the flap extends from  
30 the axis of pivot to the side of the planer.
13. A planer as claimed in any of claims 7 to 12, wherein the flap is resiliently biased to the first position.

**ABSTRACT****PLANER**

A planer comprising a body mounted on a shoe, the shoe having an aperture formed through it; a cutting drum rotatably mounted within a recess formed by a wall within the body, a part of the periphery of the cutting drum projecting through the aperture in the shoe; a motor mounted within the body to rotatably drive the cutting drum; at least one cutting blade mounted on the periphery of the drum capable of planing a work piece when the drum is rotating; an airflow generator which creates an air flow when the planer is in use within the body for use for entraining debris created by the cutting action of the blade to assist in the removal of the debris; directional means which directs the airflow within the body towards the area where the cutting blades cuts a work piece; wherein an expulsion aperture is formed in the wall of the recess forward of the cutting drum through which any debris created by the cutting action of the blade would be thrown by the rotating blade; and the airflow is directed within the body to a point below the expulsion aperture in the wall of the recess and is directed to be blown across the aperture within the body in a direction having an acute angle to the direction of travel of any debris in order to entrain the debris in the airflow within the body.

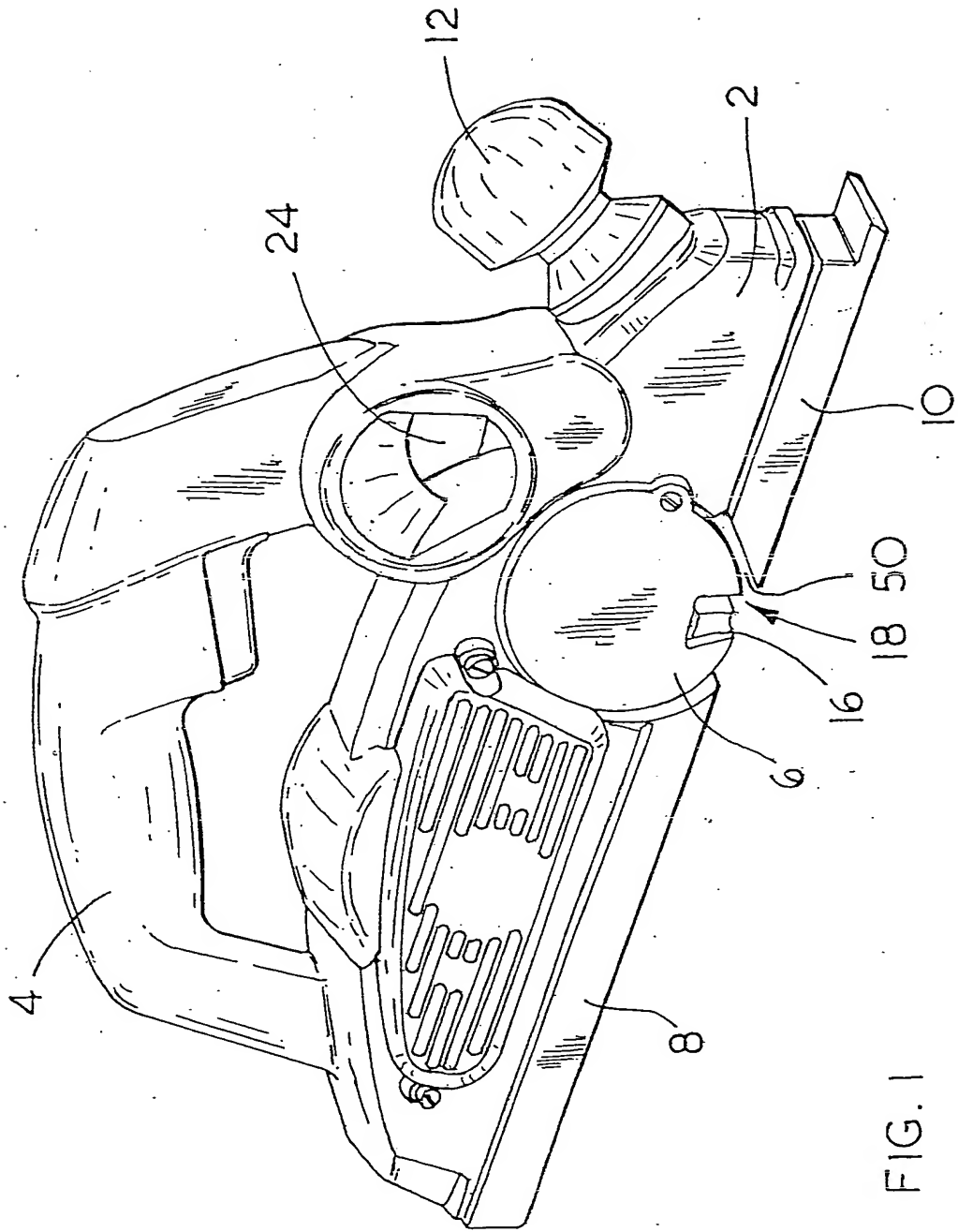


FIG. 1

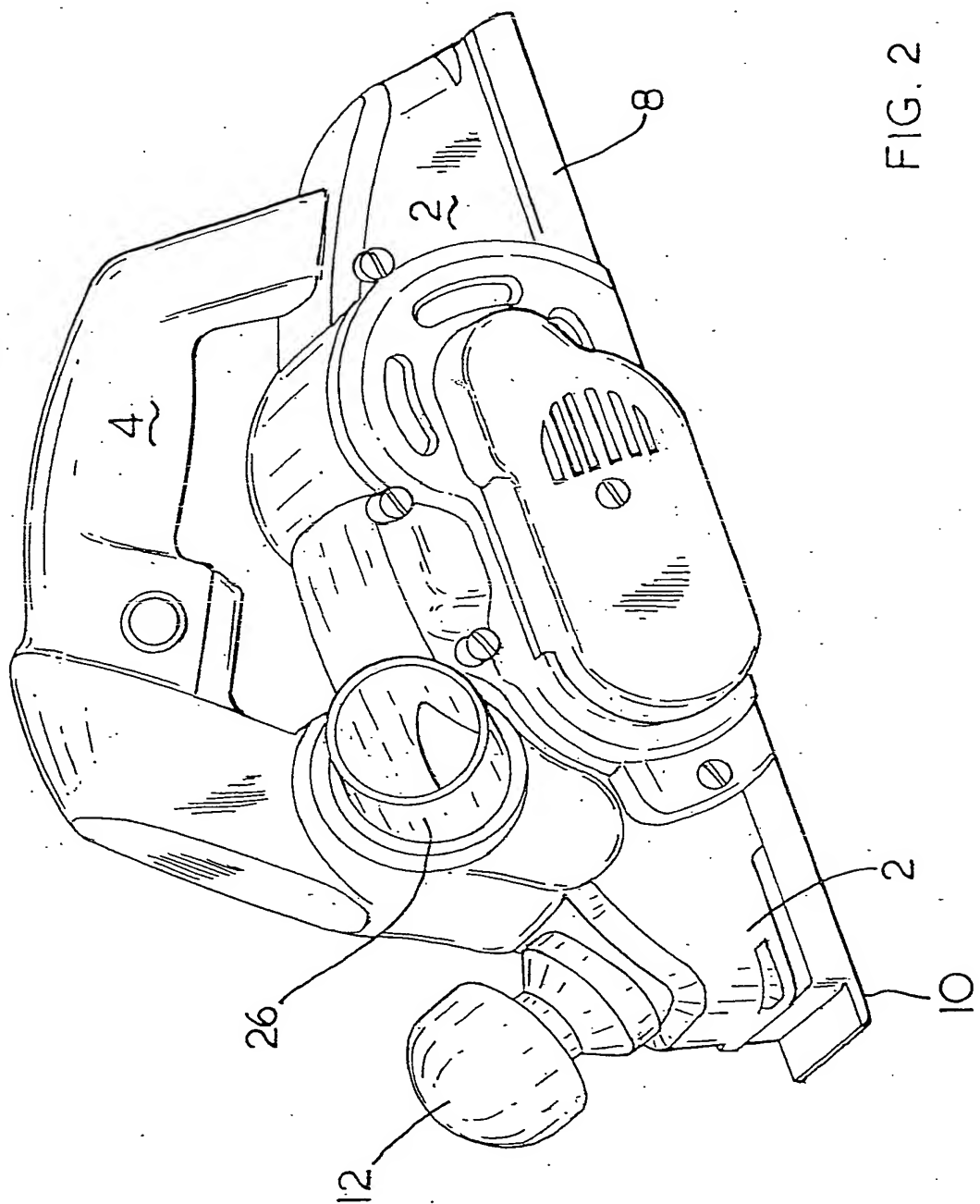


FIG. 2

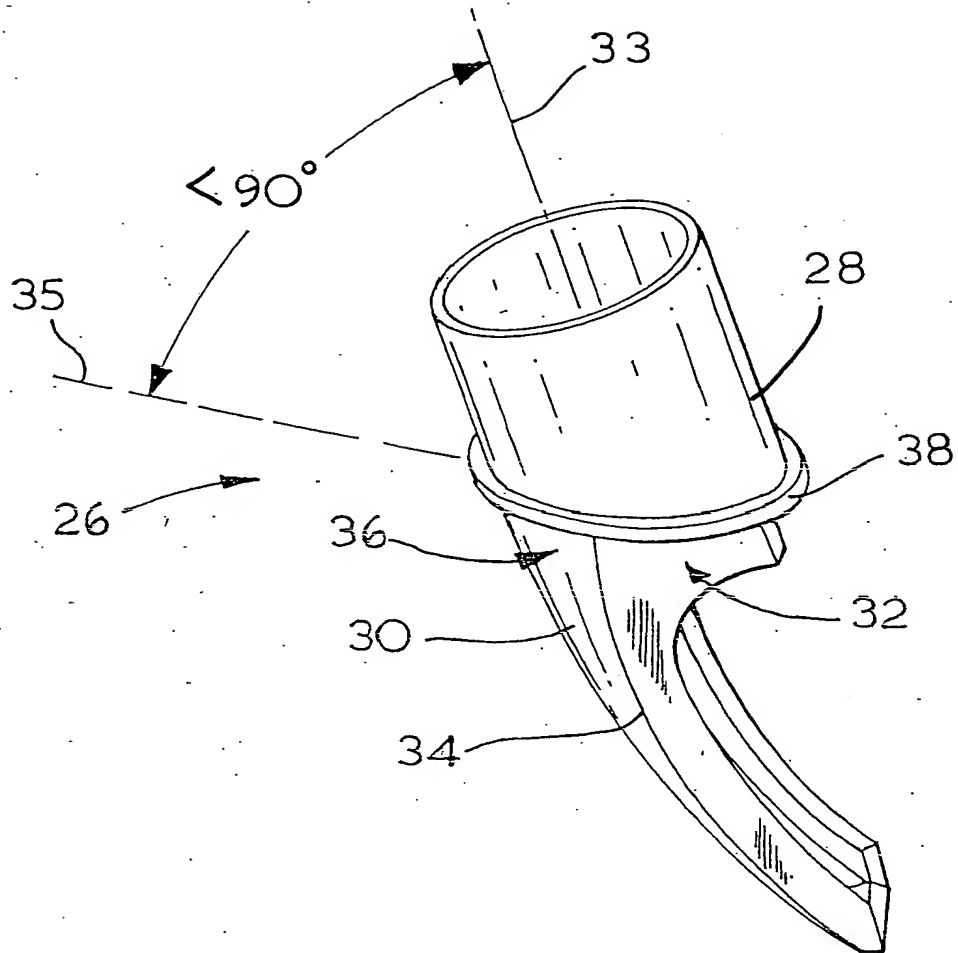
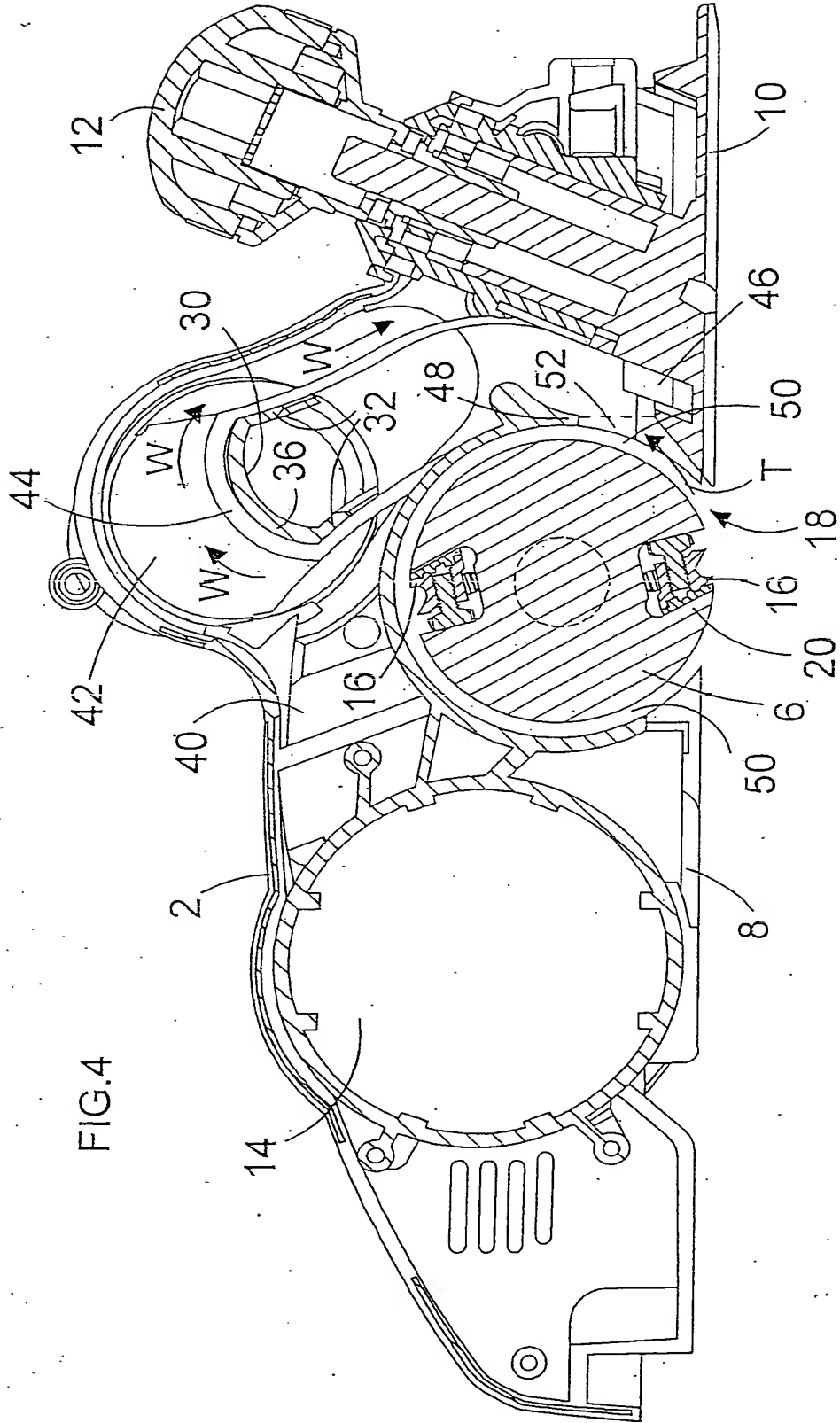
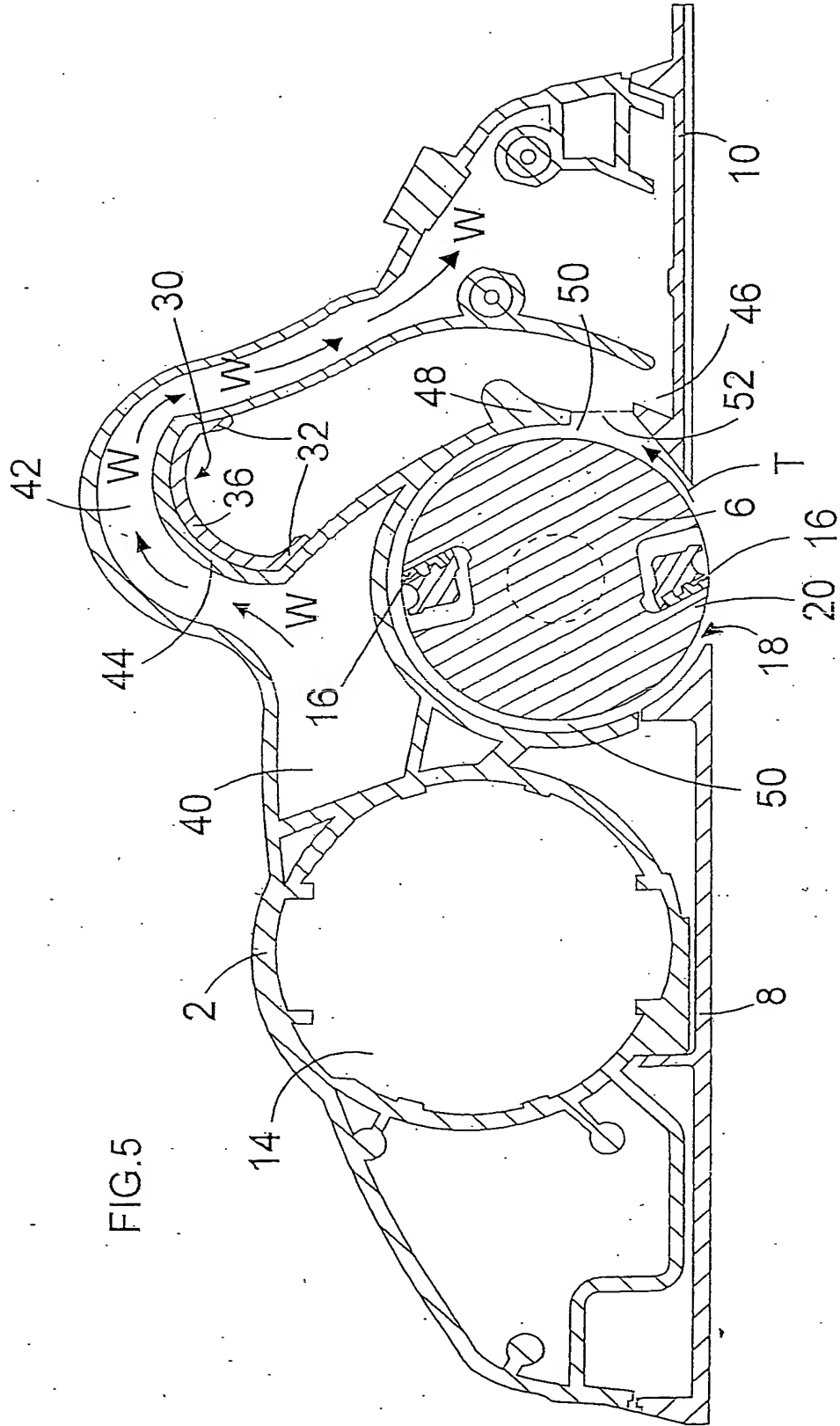


FIG. 3







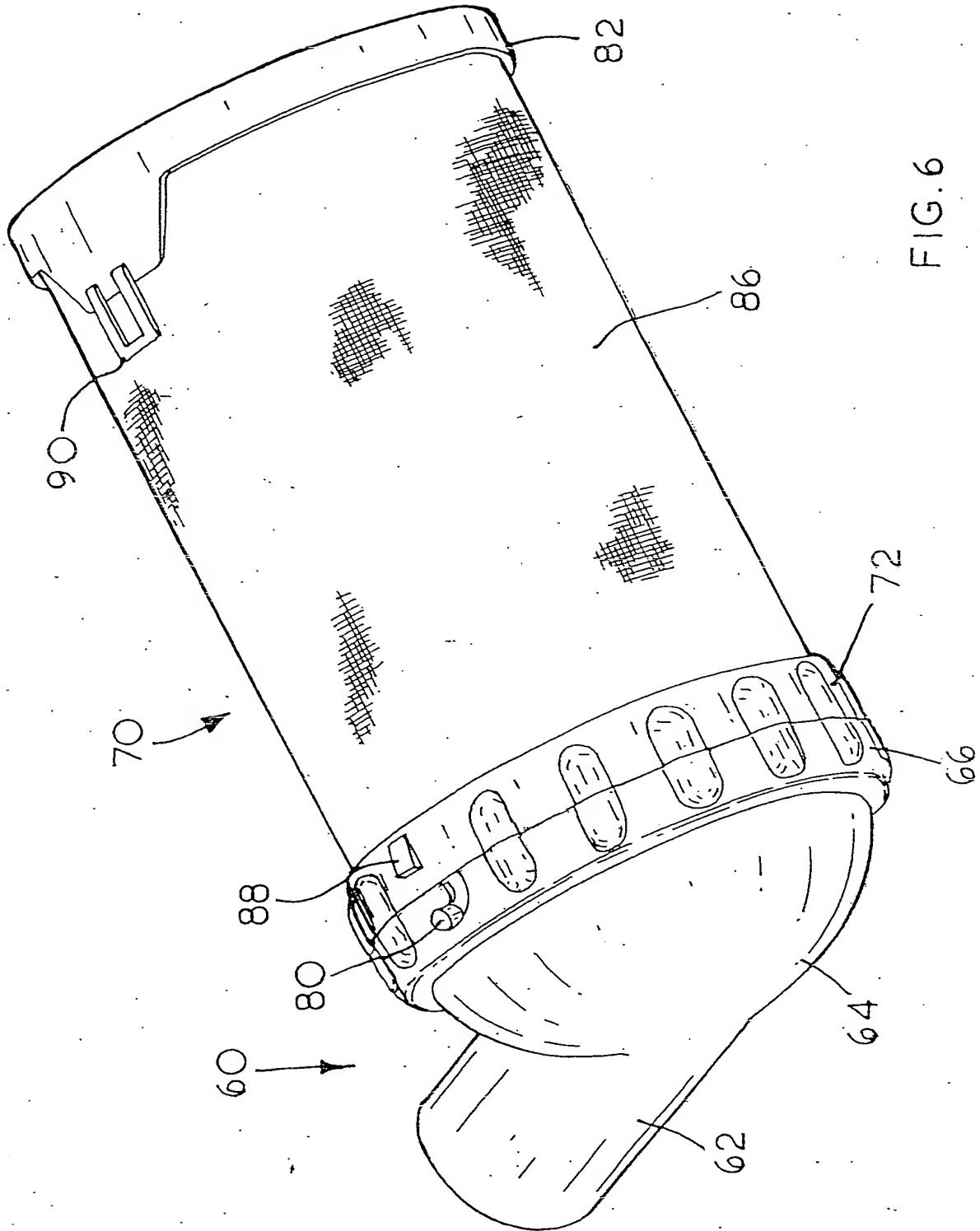


FIG. 6

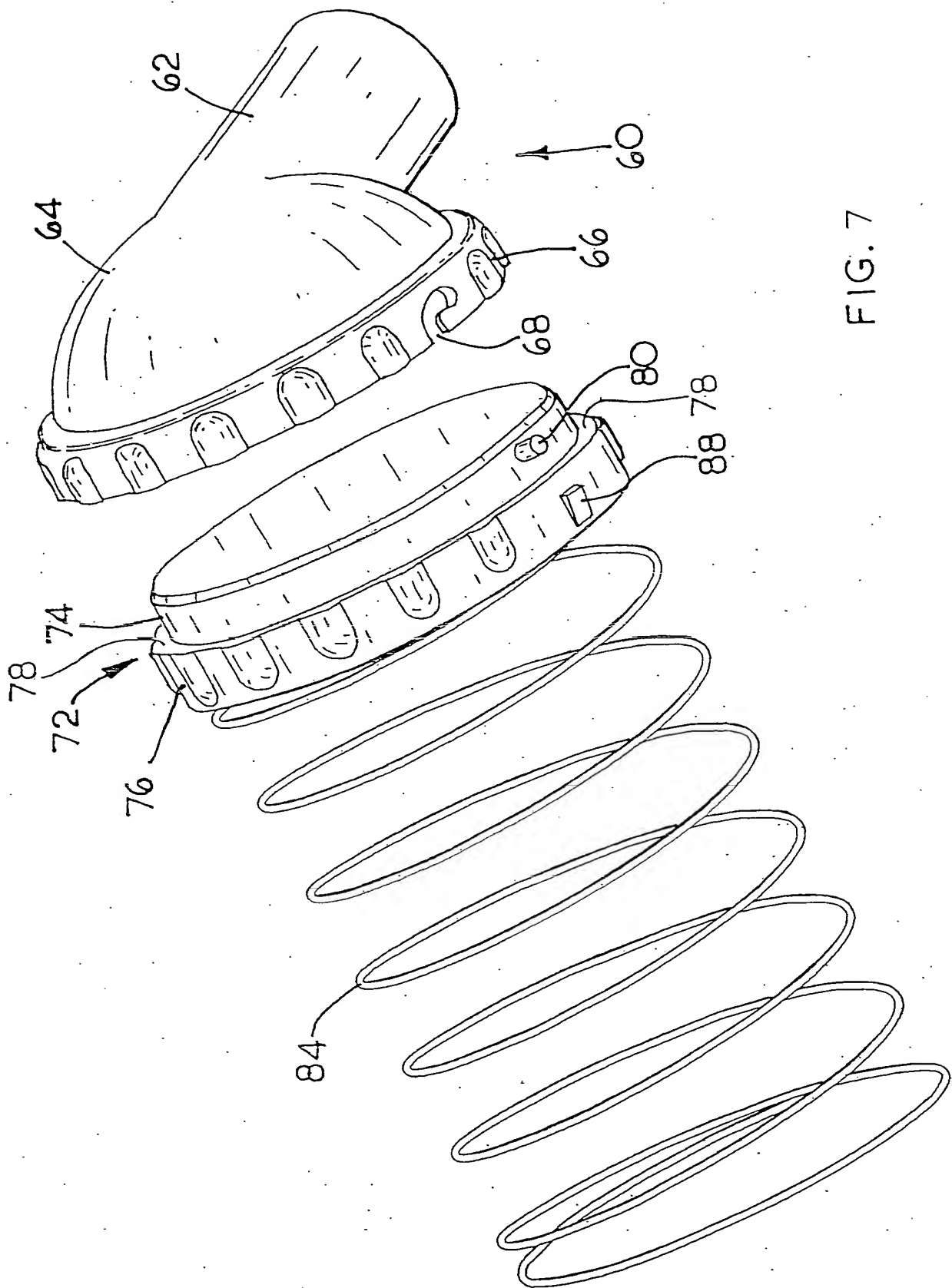
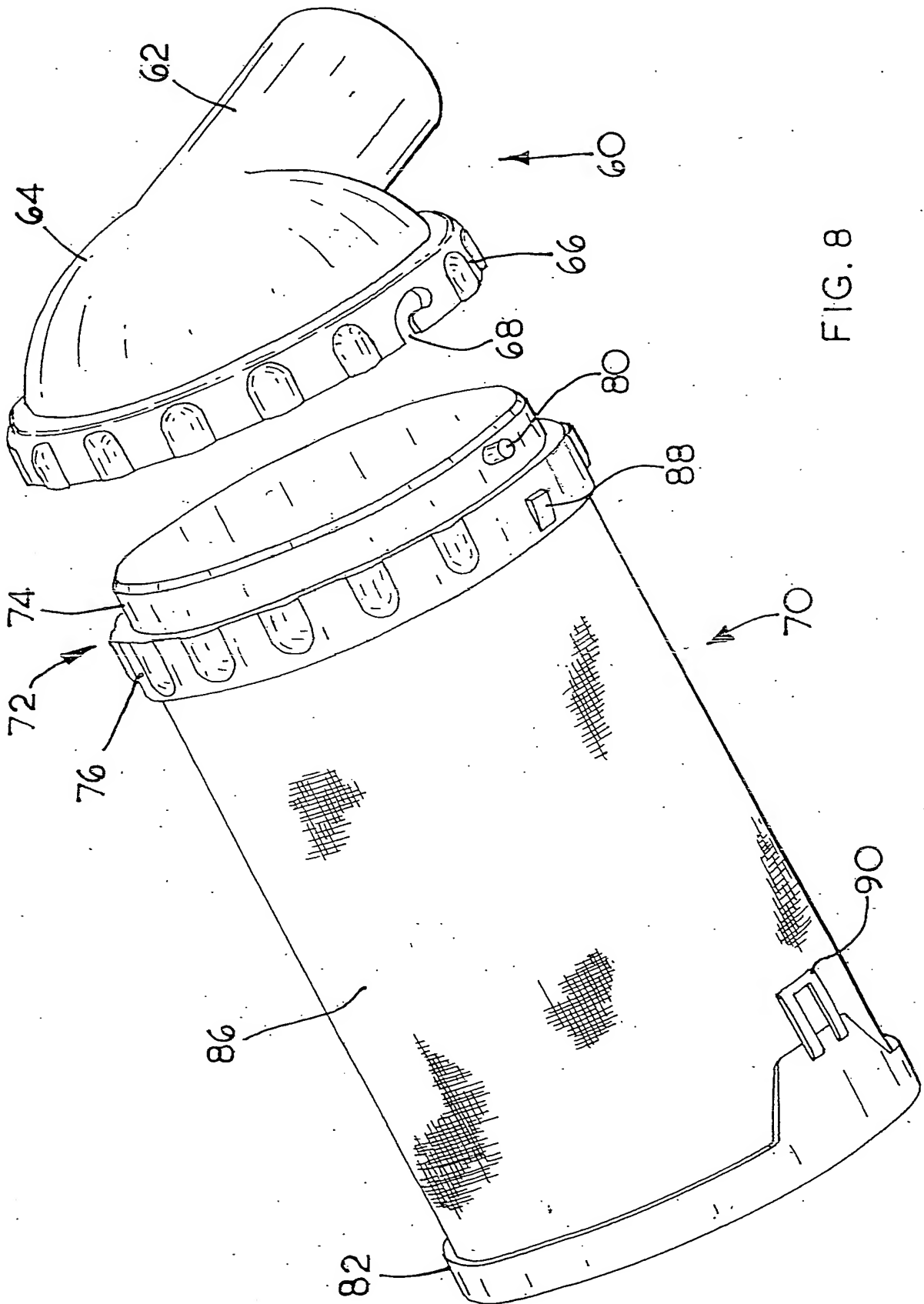


FIG. 7



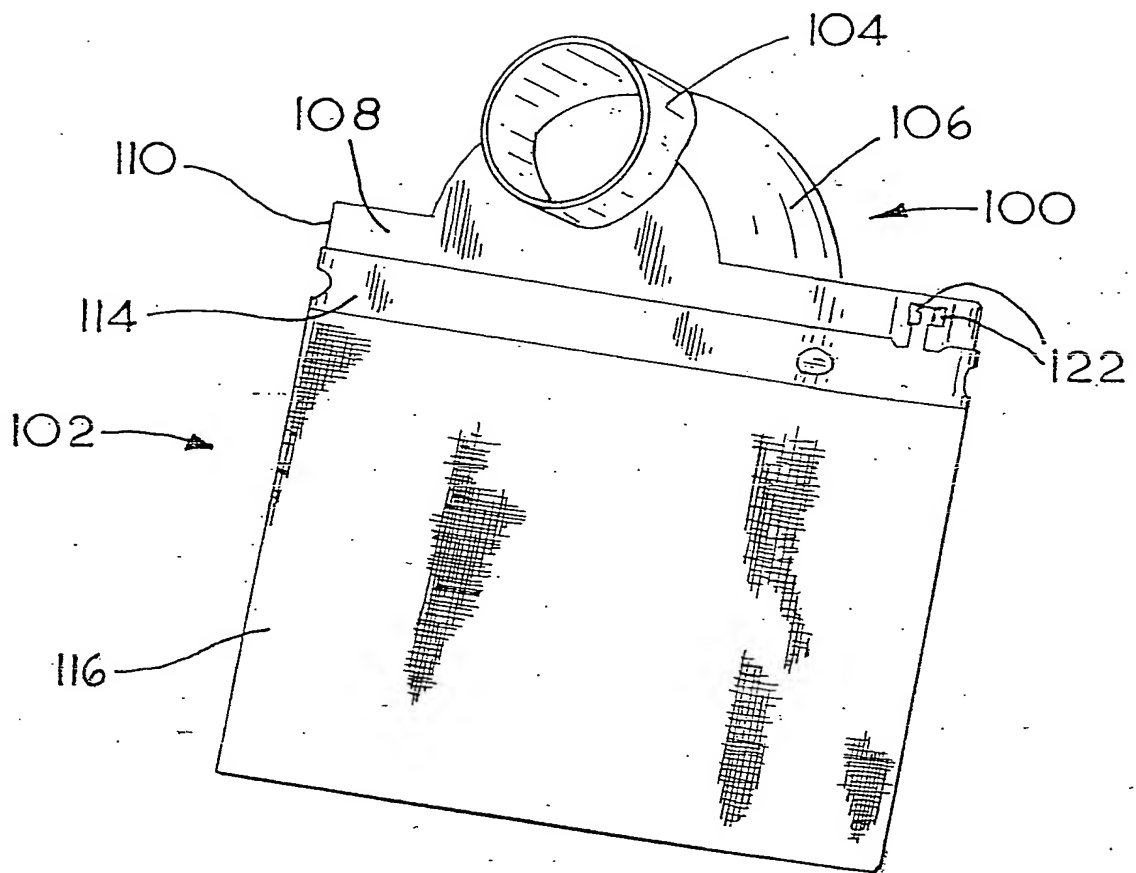


FIG. 9

10 117

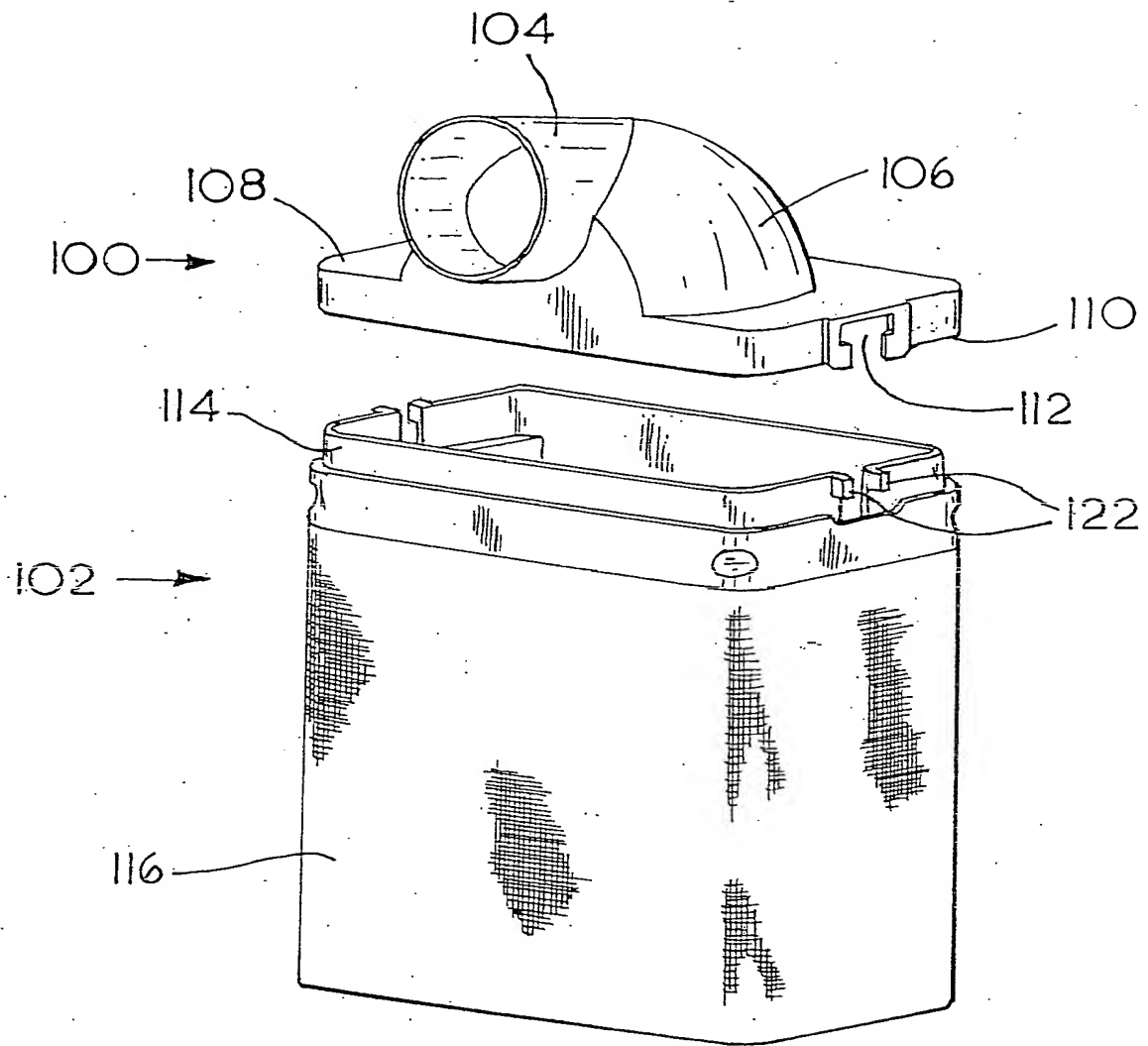


FIG. 10

11/17

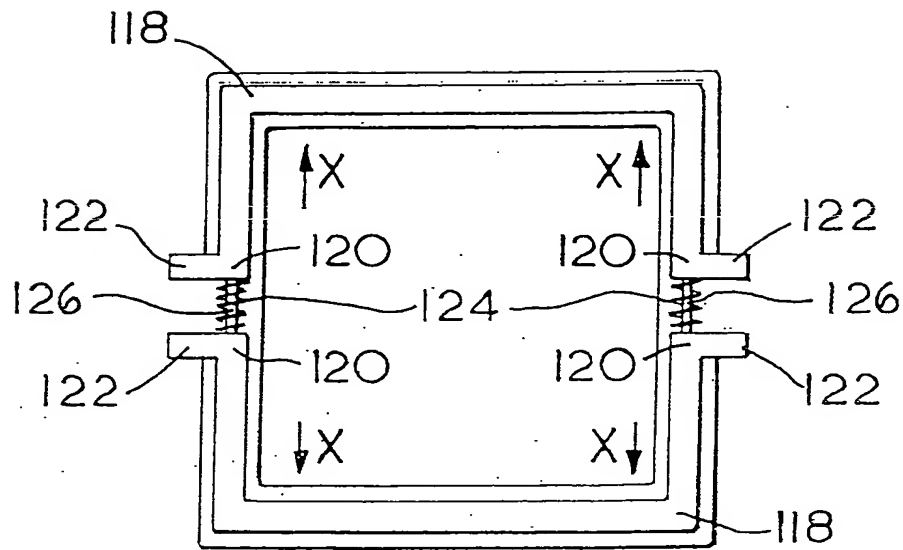


FIG. 11

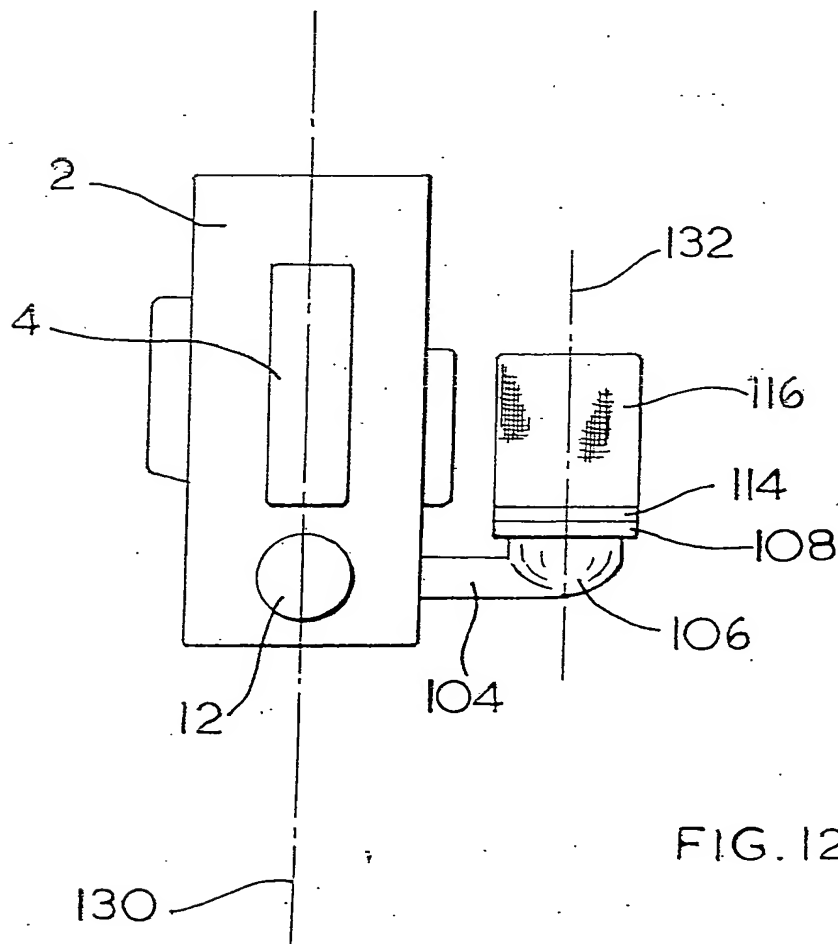
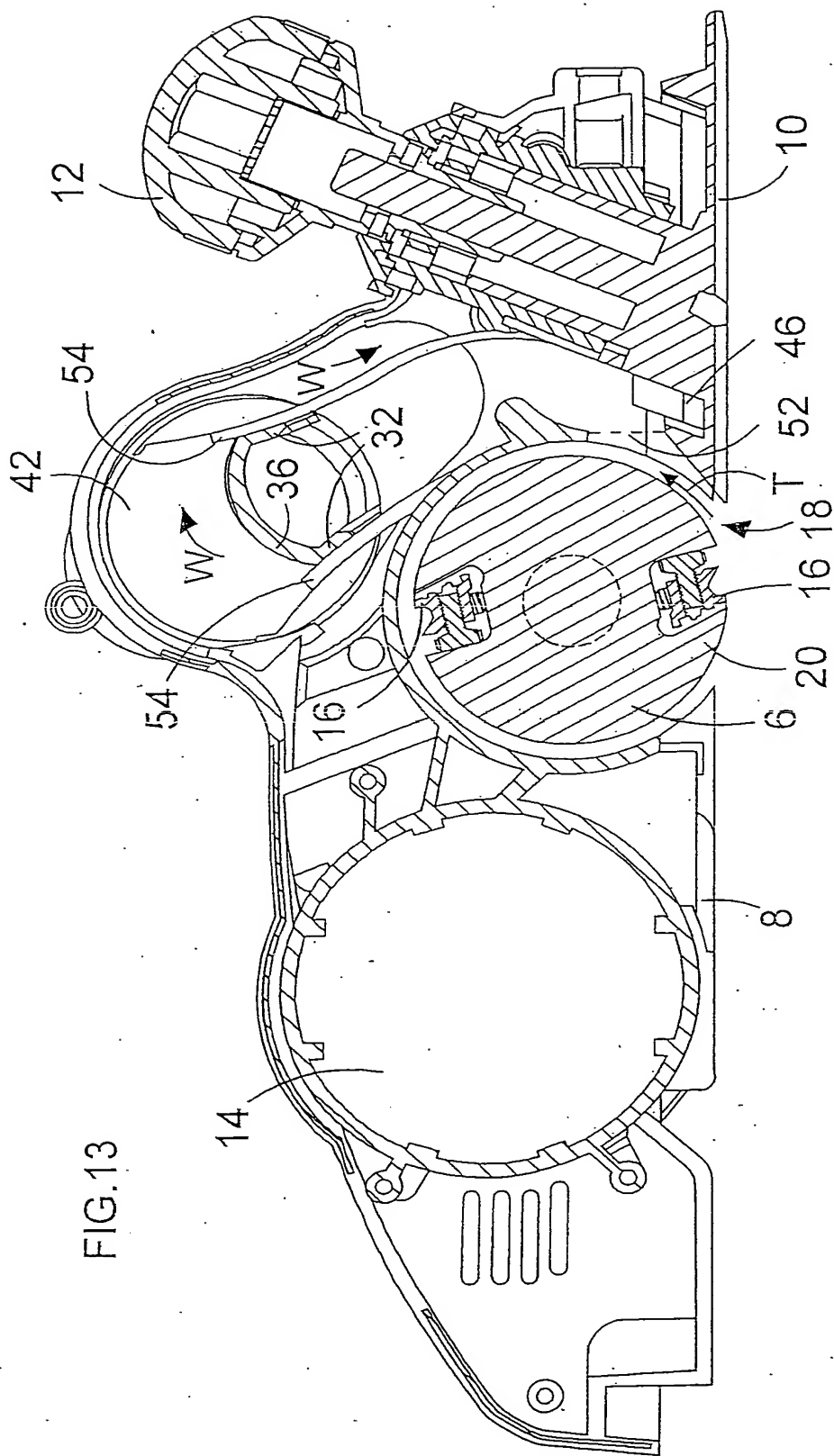
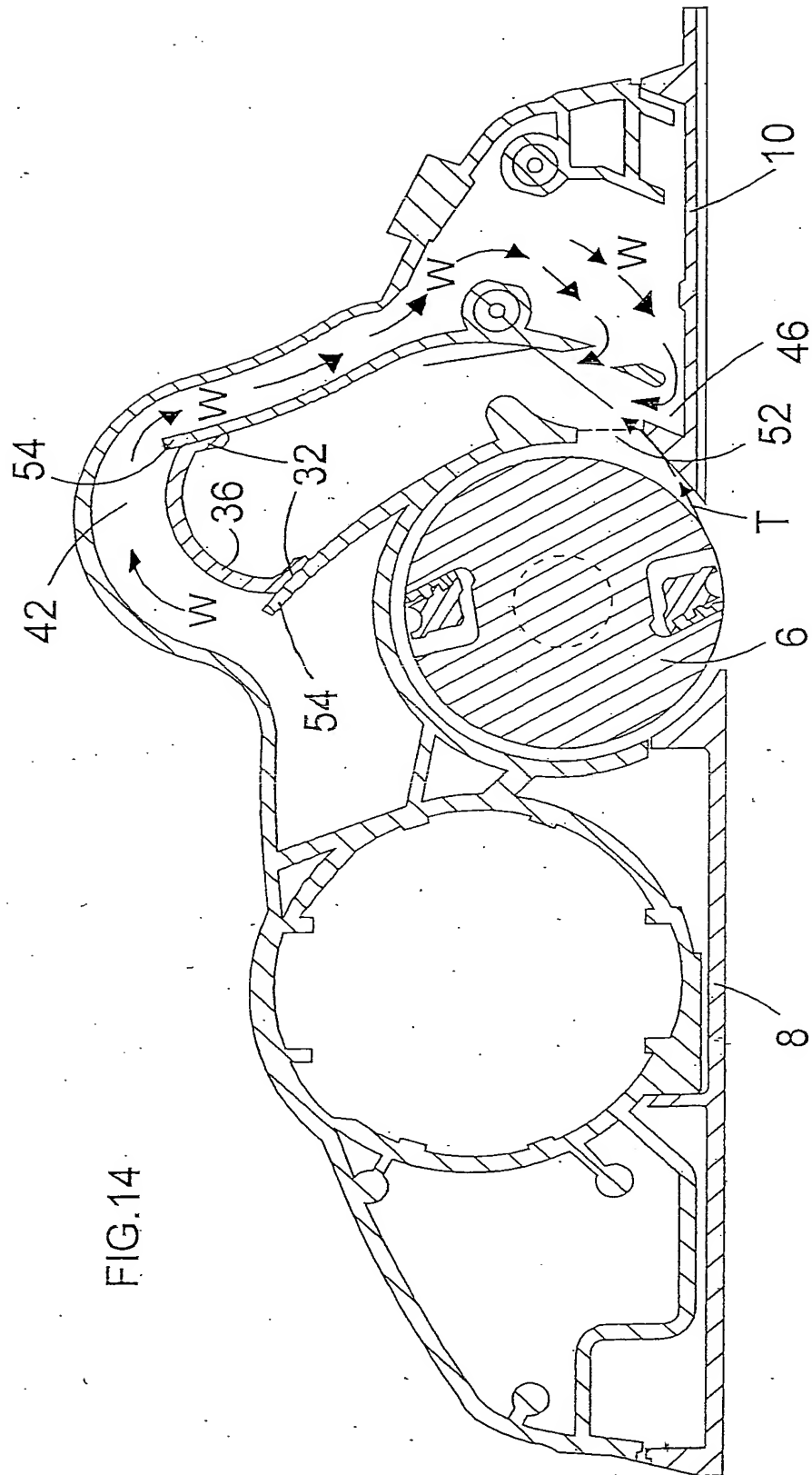


FIG. 12







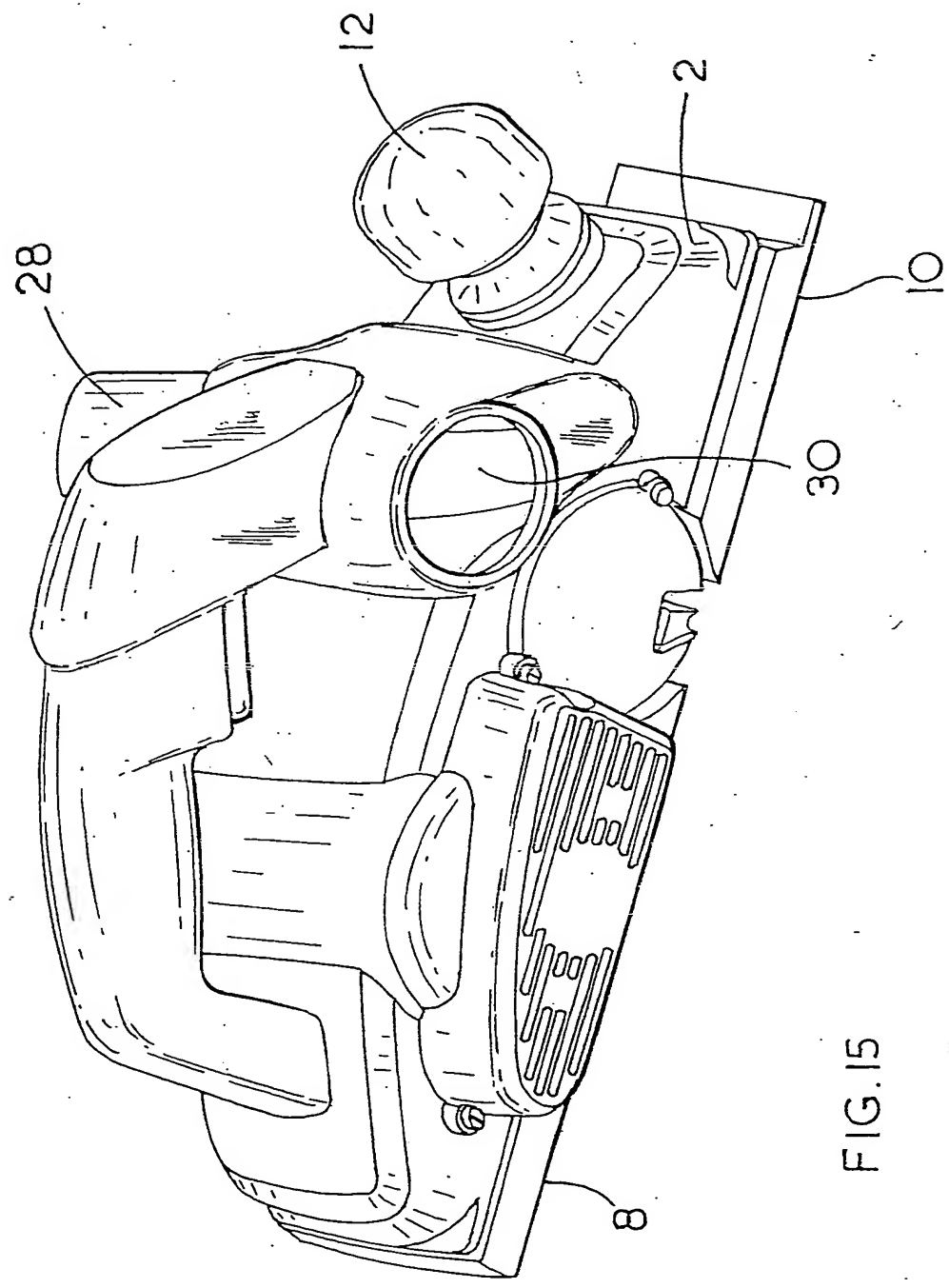
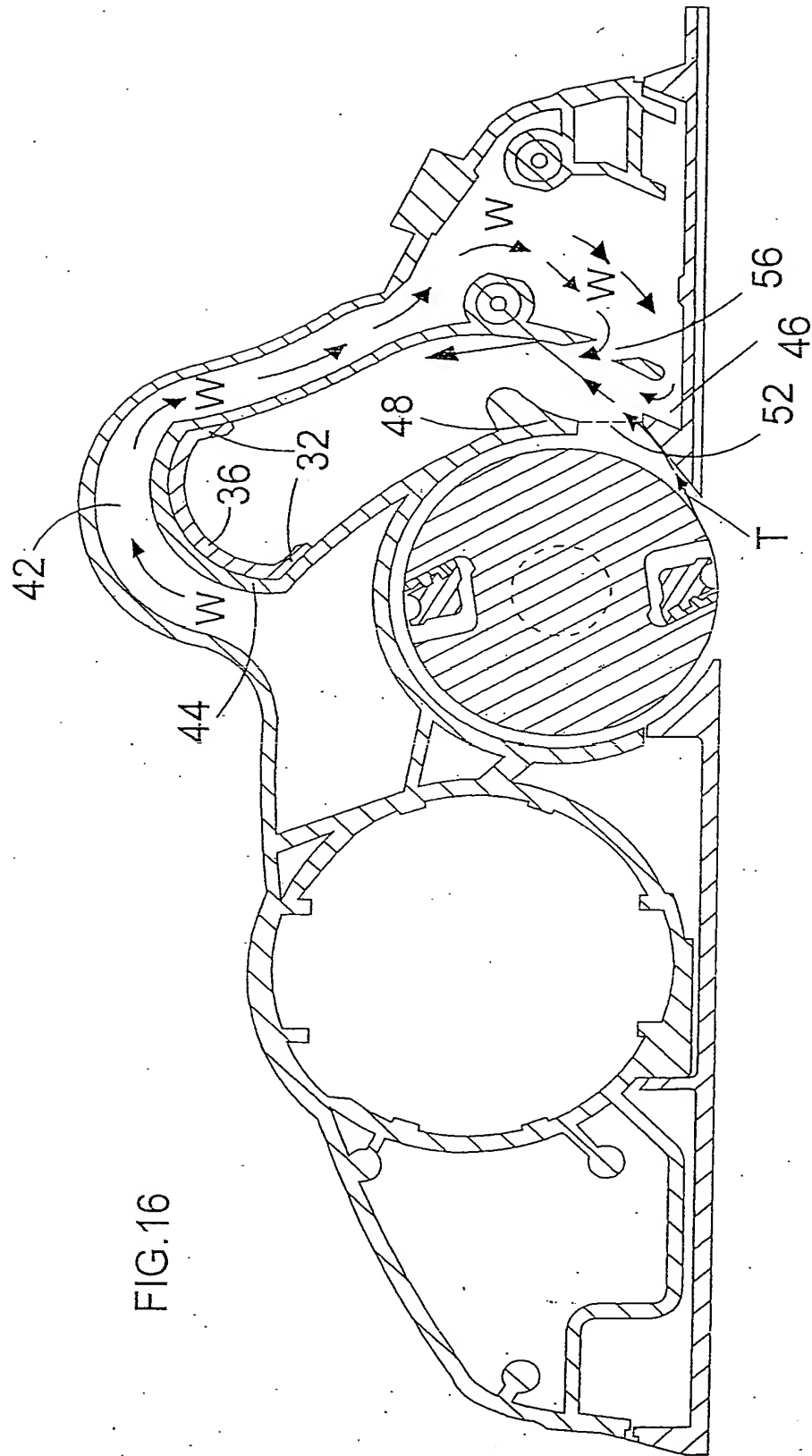


FIG. 15



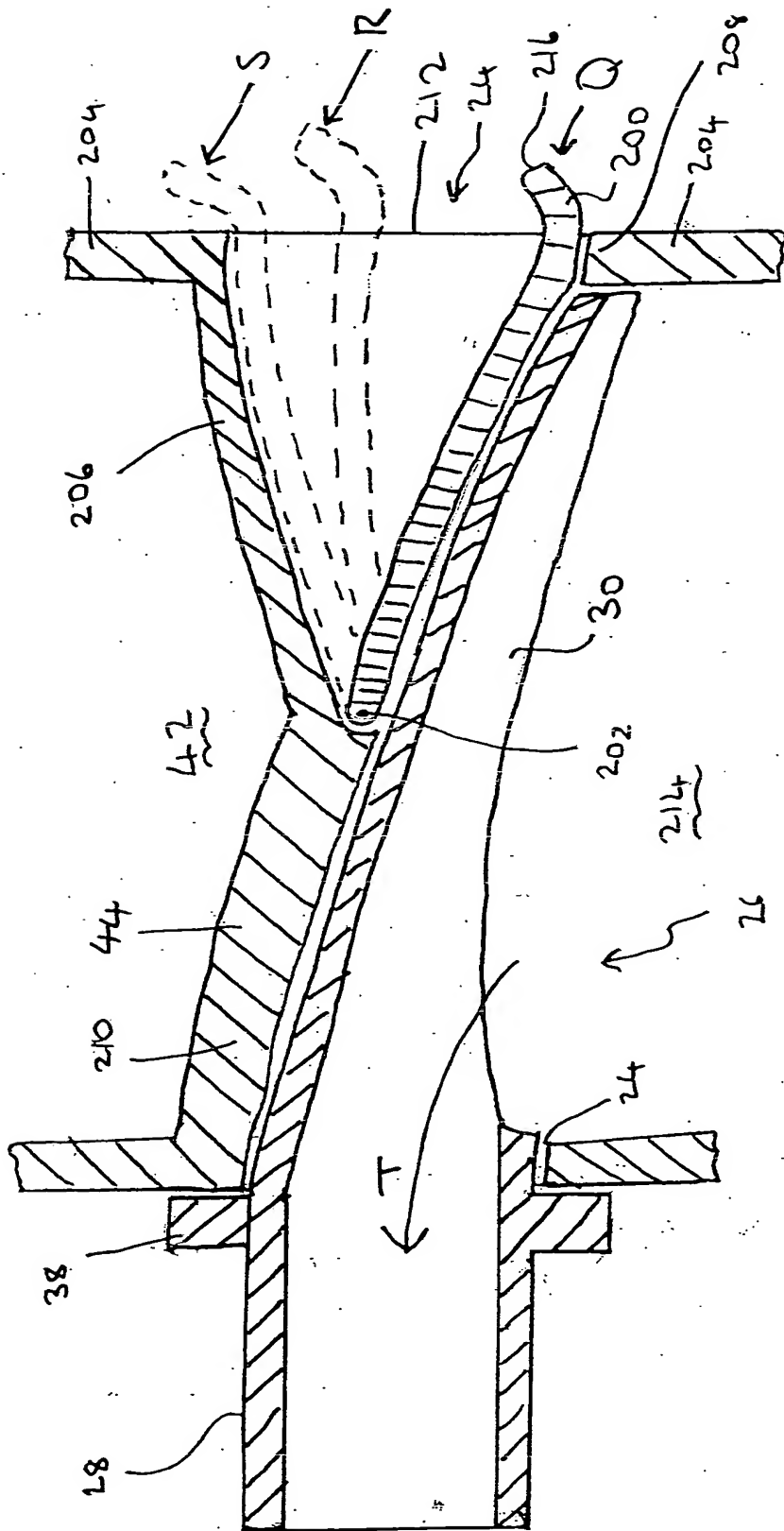


Fig. 17

